

CLAIMS

What is claimed is:

- 1 1. A method of packaging a die comprising:
2 electrically connecting the die to a substrate;
3 underfilling the space between the die and the substrate using a capillary
4 underfill; and
5 placing a pressurized material in contact with at least a portion of the die and
6 the substrate after the capillary underfill.
- 1 2. The method of claim 1 wherein the die includes a backside surface and four
2 sidewall surfaces, wherein placing a pressurized material in contact with at least a
3 portion of the die and the substrate after the capillary underfill includes
4 encapsulating the backside surface and the four sidewall surfaces with the
5 pressurized material.
- 1 3. The method of claim 2 wherein the pressurized material is a different
2 material than a material associated with underfilling the space between the substrate
3 and the die.
- 1 4. The method of claim 1 wherein the pressurized material associated with
2 placing a pressurized material in contact with at least a portion of the die is a
3 different material than a material associated with underfilling the space between the
4 substrate and the die.
- 1 5. The method of claim 1 wherein the die includes a backside surface and four
2 sidewall surfaces, wherein placing a pressurized material in contact with at least a
3 portion of the die and the substrate after the capillary underfill excludes placing the
4 pressurized material on the backside surface of the die.

1 6. The method of claim 1 wherein the die includes a backside surface and four
2 sidewall surfaces, wherein placing a pressurized material in contact with at least a
3 portion of the die and the substrate after the capillary underfill further includes:
4 placing a film on the backside of the die; and
5 placing the pressurized material on the four sidewall surfaces of the die.

1 7. The method of claim 1 wherein the die includes a backside surface and four
2 sidewall surfaces, wherein placing a pressurized material in contact with at least a
3 portion of the die and the substrate after the capillary underfill further includes:
4 placing a film on the backside of the die;
5 pressurizing the film;
6 placing the pressurized material on the four sidewall surfaces of the die; and
7 removing the film.

1 8. The method of claim 7 wherein the pressurized material is a heated epoxy
2 and wherein the film is removed after the heated epoxy is cured.

1 9. The method of claim 7 further comprising transferring heat from the
2 backside surface of the die with a heat transfer device in contact with the backside
3 surface of the die.

1 10. A semiconductor package comprising:
2 a substrate;
3 a die attached to the substrate;
4 an underfill material positioned between the die and the substrate;
5 a molding material in contact with at least a portion of the substrate and the
6 die.

1 11. The semiconductor package of claim 10 wherein the underfill material
2 positioned between the die and the substrate is different than the molding material.

1 12. The semiconductor package of claim 10 wherein the die includes:
2 a frontside surface near the substrate;
3 a backside surface; and
4 four sidewall surfaces, wherein the molding material contacts the four
5 sidewall surfaces.

1 13. The semiconductor package of claim 10 wherein the die includes:
2 a frontside surface near the substrate;
3 a backside surface; and
4 four sidewall surfaces, wherein the molding material contacts the four
5 sidewall surfaces and the backside surface is devoid of the molding material.

1 14. The semiconductor package of claim 10 wherein the die includes:
2 a frontside surface near the substrate;
3 a backside surface; and
4 four sidewall surfaces, wherein the molding material contacts the four
5 sidewall surfaces and the backside surface.

1 15. A system comprising:
2 a semiconductor package including:
3 a substrate;
4 a die attached to the substrate;
5 an underfill material positioned between the die and the substrate;
6 and
7 a molding material in contact with at least a portion of the substrate
8 and the die; and
9 a heat sink in thermal contact with the semiconductor package.

- 1 16. The system of claim 15 wherein the semiconductor package includes:
2 a backside surface; and
3 four sidewall surfaces, wherein the molding material contacts the four
4 sidewall surfaces and the backside surface.
- 1 17. The system of claim 15 wherein the semiconductor package includes:
2 a backside surface; and
3 four sidewall surfaces, wherein the molding material contacts the four
4 sidewall surfaces and the backside surface is devoid of the molding material and
5 wherein the heat sink is attached to the backside surface of the die.
- 1 18. The system of claim 17 further comprising a thermally conductive material
2 located between the backside surface of the die and the heat sink.
- 1 19. The system of claim 15 further comprising a printed circuit board wherein
2 the semiconductor package is attached to the printed circuit board.
- 1 20. The system of claim 15 wherein the die of the semiconductor package is a
2 microprocessor.
- 1 21. A method of packaging a die comprising:
2 attaching the die to a substrate;
3 underfilling the space between the die and the substrate with a first material;
4 and
5 placing a second material in contact with at least a portion of the die and the
6 substrate after underfilling the space between the die and substrate with the first
7 material.
- 1 22. The method of claim 21 wherein the first material is a curable epoxy.

- 1 23. The method of claim 21 wherein a capillary action of the first material is
2 used in underfilling the space between the die and the substrate.
- 1 24. The method of claim 21 wherein the second material is a curable epoxy.
- 1 25. The method of claim 21 wherein placing a second material in contact with
2 at least a portion of the die and the substrate includes encapsulating the die.
- 1 26. The method of claim 21 wherein placing a second material in contact with at
2 least a portion of the die and the substrate includes partially encapsulating the die.
- 1 27. The method of claim 26 wherein the die includes a backside surface and at
2 least four sidewall surfaces, wherein partially encapsulating the die includes:
3 placing a film on the backside surface of the die;
4 applying a force to the film; and
5 encapsulating the four sidewalls of the die with the second material
6 while leaving the backside surface of the die devoid of the second material.
- 1 28. The method of claim 27 further including removing the film from the
2 backside surface of the die.
- 1 29. The method of claim 21 wherein the die includes a backside surface and at
2 least four sidewall surfaces, wherein placing a second material in contact with at
3 least a portion of the die and the substrate includes leaving the backside surface of
4 the die devoid of the second material.